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Weighing the snow core to determine the water content

FEDERAL-STATE COOPERATIVE
SNOW SURVEYS AND IRRIGATION WATER FORECASTS
for

MISSOURI and ARKANSAS DRAINAGE BASINS

FEBRUARY 1, 1945

By

Division of Irrigation, Soil Conservation Service
United States Department of Agriculture
and
Colorado Agricultural Experiment Station

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Data included in this report were obtained by the agencies named above in cooperation with the U. S. Forest Service, National Park Service, State Engineers of Colorado, Wyoming and New Mexico and other Federal, State and local organizations.





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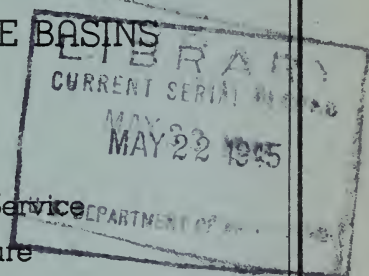
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24-7-9-NR

Res. 41%

15-3-5-NR

Res 58%

16-3-4-NR

21N 9-4-81
2-8-11-NR

29-8-11-67

22-5-7-40

17-3-3-60

FOR
SLIP
TINS
AFKAN
RIO G
SHEDS

FEBRUARY 1, 1945

22-4-7-X

34-8-10-18

26-6-6-15

Kingsley
Res. 34%

35-8-10-X

31-7-9-X

23-6-7-42

13-5-6-10

37-8-9-52

22-5-6-23

29-6-6-37

31-9-7-50

12-2-2-53

36-9-9-6 El Yago Res.
29%

23-4-4-25

Lake Mend
62%

NEW MEXICO

Elephant Butte
Res 58%

16-4-3-29

TEXAS

WATER SUPPLY OUTLOOK

MISSOURI-ARKANSAS DRAINAGE BASINS

The water outlook at the present time for the Missouri drainage in Montana is not favorable except for the Madison. In northern Wyoming the prospects for next season's irrigation supply are fairly good. Runoff in the Black Hills area will be much above normal. For the North Platte and tributaries the prospects are favorable except the Sweetwater which will probably be short. South Platte and tributaries are satisfactory and Arkansas Valley has large reservoir storage with irrigation supply virtually assured.

MISSOURI RIVER AND TRIBUTARIES IN MONTANA

JEFFERSON: The average water content of the snow is now 2.8 inches as compared with 1.7 a year ago, the 10-year average is 3.8. The outlook for the coming season's run-off is only fair as based on these records.

MADISON: For this drainage the average water content is now 7.6 inches, last year it was 5.6 and the 10-year average is 10.9. The run-off may be expected to be more than it was last year and probably approach normal stage.

GALLATIN: The run-off for the coming irrigation season will likely approach that of last year as based on the present average water content of the snow on the watershed of this stream. The average water content is now 3.9 inches, last year 4.1, and the 10-year mean 6.0. The soil moisture throughout the Gallatin valley is fair to good and range conditions satisfactory. Snow cover in the lower areas is reported to be light. Stream flow in southern Montana is slightly below normal.

MARIAS: The snow cover on this watershed is now better than it was a year ago. The average water content is 6.9 inches, last year 4.6, and the 10-year average 9.0. Like all other tributary streams to the Missouri except the Gallatin, the snow-water storage is roughly one-half more than last year and about three-quarters of the 10-year average. The expected run-off, as based on present conditions, may approach normal stage.

MISSOURI: The present outlook for this season's run-off in the Missouri, below Threeforks, is for a subnormal flow. The water content of the snow over the several tributaries is now about 5 inches, last year slightly under 4 and the 10-year average approximately 7 inches. Deficient precipitation during the fall months over the watersheds of the several tributaries resulted in a subnormal soil moisture condition at the start of winter. A part of the snow-melt next spring will be consumed in

bringing the soil to the yield point of run-off. This absorption is expected to reduce appreciably the total flow of this stream. Reservoir storage in this basin is now fairly good.

SHOSHONE RIVER

On the watershed of this stream the water content of the present snow cover averages 8.2 inches which is nearly 3 inches more than it was a year ago. The Shoshone Reservoir near Cody, Wyoming, now has in storage 306,000 acre feet of water which is two-thirds of its capacity. It is confidently expected that this reservoir will fill to capacity before the start of the irrigation season this coming summer. On the Shoshone Project, at Powell, the soil moisture conditions are fair and stream flow about normal. Most of the livestock range is now snow covered. The prospects for the coming season's water supply is fairly satisfactory at this time.

BIG HORN RIVER

The snow conditions on the watershed of this stream are now practically the same as they were a year ago with a water content of just two inches less than the 10-year average of 7.2 inches. The present storage in Bull Lake and Pilot Butte reservoirs totals 74,000 acre-feet which is about 70 percent of the amount held last year at this time and 40 percent of the combined capacity. In the Riverton, Thermopolis and Worland areas the soil moisture is reported to be fair to good, stream flow generally normal and range conditions good. The farming areas are now mostly snow covered. The outlook may be said to be satisfactory at this time for an ample water supply this coming season. Winter came with a dry soil over the watershed of this stream and its tributaries.

CHEYENNE RIVER

Snow cover in eastern Wyoming and the Black Hills areas in South Dakota is now about the same as last year at this time. On the Upper Spearfish snow course a year ago the snow held 4.7 inches of water and at present it is 4.3. In the Belle Fourche Reservoir, the principal irrigation storage in this area, there is now 118,900 acre-feet of water as compared with 95,300 a year ago. Over the Belle Fourche Project area the soil moisture conditions are excellent, stream flow now above average and the range area snow covered to a depth of about one foot. The run-off last year was ample to meet irrigation needs and was substantial in the accumulation of stored water. At present the outlook for the coming season's irrigation water supply is especially good.

NORTH PLATTE RIVER

The water content of the snow cover on the headwaters of this stream and its tributaries averages 8.0 inches, an increase of about one-third over that of last year at this time. The 10-year average is 9.7. The density of the snow is 23 percent, which is about normal for this time of

year. In the North Park area the meadows are snow covered to a greater depth than a year ago. The snow-water storage on Rabbit Ears Pass is now 3.6 inches more than last year, Old Battle only 0.2 inch more and on the west slope of the Snowy Range it is greater by 5.4 inches. The storage in the principal reservoirs on the North Platte in Wyoming is now 407,400 acre-feet, last year at this time it was 530,500. The river flow is now normal and further storage is accumulating. There is now 19,300 acre-feet of storage in Lake Minatare, in western Nebraska, last year at this time it was 11,800. The combined storage in the Kingsley and Sutherland reservoirs, in Nebraska, totals 747,000 acre-feet, a year ago it was 675,000. Generally throughout the North Platte valley, both in Wyoming and Nebraska, the soil moisture conditions are fair to good, especially the lower valley, streams at about normal stage, and range conditions good. The outlook now for the water supply next summer is favorable as reflected by the present substantial water content of the snow, the more than 400 thousand acre-feet of storage in Wyoming and the favorable soil moisture throughout the agricultural areas of the valley.

SWEETWATER RIVER

The snow cover on this watershed is now less than a year ago. The present average water content is 3.9 inches, last year it was 4.6 and the ten-year average 6.6. This stream contributes normally about 50,000 acre-feet to the summer's irrigation supply of the North Platte valley.

LARAMIE RIVER

The average water content of the snow on the headwaters of this stream is now 5.6 inches, last year at this time it was 3.4 and the longtime average 6.1. The snow-water storage is close to the normal and at this time the outlook is quite favorable for the coming season's water supply, as based on present snow cover conditions. The reservoir storage on the Wheatland Project is now about 10,000 acre-feet as compared with nearly 28,000 a year ago. Soil moisture is reported to be poor to fair in the upper valley and fair to good in the lower country which is now snow covered.

SOUTH PLATTE RIVER BASIN

CACHE LA POUDE: The present snow conditions on the headwaters of this stream and its tributaries are now much improved over that of last year at this time. The average water content, as measured on six snow courses, is 5.5 inches, a year ago it was 3.4 and the ten-year average 6.2. On Cameron Pass the recent snow survey shows the water content to be 9.7 inches, a year ago it was 8.0, on top Deadman Hill, north fork of the Poudre, it was 6.5 as compared with 4.3 a year ago, headwaters of the Big South now 6.7 and last year 5.7 and on the headwaters of the Little South it is now 3.7 inches as compared with only 0.7 a year ago. The reservoir storage in the mountains and along the Poudre valley is now about 24,000 acre-feet, last year it was 42,400, about 40 percent less. Soil moisture in both the mountains and farming areas of this drainage

is only poor to fair, streams are below normal stage and the areas at lower elevation bare of snow. The general prospects for an adequate irrigation supply next summer, as based on the present snow cover, are fairly good. Deficient soil moisture over the headwaters detracts from the present water supply outlook for this coming season.

BIG THOMPSON: At present the outlook for this season's irrigation supply is quite favorable as indicated by the snow cover on the headwaters of this stream. The average water content is now 5.4 inches as compared with 4.1 a year ago. The 10-year average is 8.2. The reservoir storage in the Big Thompson valley is now 32,500 acre-feet, a year ago it was 33,200. A considerable part of the present water in storage is a hold-over from last year. Over the farming areas of the valley the soil moisture is reported to be good and stream flow normal. Moderate weather has strengthened the run-off in most of the northern Colorado streams.

ST. VRAIN: The snow-water storage on the headwaters of the St. Vrain now exceeds that of last year at this time. On the Wild Basin snow course the water content is now 5.2 inches, a year ago it was 2.7, practically twice as much. The 10-year average is 6.0. The reservoir storage in the valley is fairly good and approximates that of last year at this time. It is reported that the soil moisture is only fair throughout the farming districts of the valley. Stream flow is subnormal. The general water outlook is now quite favorable and in all probability the reservoirs in the valley will approach full capacity by mid-June.

BOULDER CREEK: On this watershed the present average water content of the snow is 5.8 inches and a year ago it was 2.3. The 10-year average is 5.6. The density of the snow is 25 percent or one inch of water to 4 inches depth of snow which is indicative of a more sustained flow this coming summer. The present snow cover now gives promise for a normal run-off to meet the irrigation requirement this coming season. Reservoir storage in the valley is now less than it was a year ago by about 15 percent. Soil moisture is generally fair in the farming districts and stream flow somewhat below normal. Range and crop conditions are satisfactory.

CLEAR CREEK: On the watershed of this stream the snow conditions are much the same as elsewhere. At present the snow has an average water content of 5.5 inches as compared with 4.2 a year ago. The 10-year average is 6.9. The water prospects for the coming season are now fairly good, at least an improvement over that of last year at this time. Because of deficient precipitation last fall the farming areas irrigated from this stream have subnormal soil moisture. The streams in this drainage are now about normal and range and crop conditions are quite satisfactory.

CROW CREEK: On the headwaters of this stream, east of Laramie, Wyoming, the snow cover is much above that of a year ago. At present the water content is found to be 2.7 inches, which equals the 10-year average. Last year at this time it was 1.8 inches. The prospects for the run-off from snow are improved as compared with conditions a year ago. Because of the relatively low elevation of the watershed the season's runoff from the

mountain area will be largely confined to the May-June flow. Inflow from numerous tributaries on the plains contribute much to the total annual water supply of this stream.

SOUTH PLATTE: The snow cover on the headwaters of the South Platte, above Denver, is at this time relatively light in comparison with the conditions on the watersheds of the several tributaries. The average water content is now 1.6 inches, last year 1.3 and the long time average 2.8. The outlook at present is doubtful for a normal run-off this coming season.

As an overall picture of the whole South Platte basin the water prospects for this coming summer, as based on snow-water storage, is now quite favorable. Reservoir storage is generally good and forms the back log of assurance for adequate water this season. Storage in the upper South Platte valley is now on a par with that of last year, approximately 200,000 acre-feet. In the lower valley the storage is 146,000 acre-feet and last year at this time it was 156,000. Because of the substantial return flow, which is largely stored for use next summer, these reservoirs will probably fill to capacity. Throughout the entire South Platte valley the soil moisture over the farming area is reasonably good and the lower river valley normal or better.

ARKANSAS RIVER

Snow conditions in the mountain areas of the Arkansas drainage gives promise at this time of a favorable run-off. The average water content of the snow on the headwaters of this stream, and its tributaries, is now 4.7 inches. Last year at this time it was 3.9 and the 10-year average 5.6. The advantage of more water in the snow, over that a year ago, is partly offset because of the dry soil condition in the mountains at the start of winter. Storage in the reservoirs, including both mountain and plains, now approaches record filling for this time of year. This total approximates 300,000 acre-feet at present with additional accumulated storage since the first of the month. Last year at this time the filling was about 140,000. Because of the very favorable storage at this time together with the opportunity of additional filling during the late spring months, the full irrigation needs of the Arkansas Valley are now virtually assured. The soil moisture conditions are somewhat varied. On the Purgatoire, Trinidad district, it is good. Fountain Valley it is poor, Pueblo area, fair, at Las Animas fair and Lamar it is good. The river flow at Pueblo is approximately 75 percent normal.

Explanation of Map Indicating the Water Supply
Conditions for Various Drainage Basins as of February 1, 1945

This map is intended to show in a broad way the water supply conditions in the various main drainage basins in Montana, Wyoming, Colorado, New Mexico and Arizona. It is believed that the introduction of this feature of the report will provide a quick overall picture of the particular watershed in which the reader may be interested.

A series of numbers, placed in close proximity to the name of the stream, serves as the means of interpretation of the water supply situation in that drainage area. The first number is an index of average depth of snow, and the second, of the average water content of the snow, as determined by surveys on the several snow courses on the watershed, the third, the long time average water content, and the fourth the reservoir storage in percent of capacity. The letters, NR, mean no report available covering that particular item, and X, that no large reservoirs, or major storage exists on that drainage area.

As an example, 30-8-10-65. This would be interpreted as follows: There is 30 inches of snow, as an average depth, based on actual measurements taken on snow courses scattered over the drainage basin. The average water content determined by these surveys is 8 inches. Past records on these same courses show an average water content of 10 inches (which in comparison with the present condition, indicates a deficiency of 2 inches.) The last figure, 65, is the percentage of the total water in reservoir storage as based on the total capacity of the particular reservoirs considered.

SNOW SURVEYS AND IRRIGATION WATER FORECASTS
FOR MISSOURI AND ARKANSAS RIVERS
February 1, 1945

P R E C I P I T A T I O N D A T A

WATERSHED	STATE	Precipitation October 1 to January 31	Departure from Normal	Precipitation		Departure from Normal
				January	Inches	
Missouri	East. Mont.	Inches 1.47	Inches -0.98	Inches 0.48	Inches -0.04	
Missouri	Cent. Mont.	1.77	-1.33	0.38	-0.29	
Missouri	North Wyo.	4.92	-0.62	1.04	-0.55	
North Platte	Wyoming	3.21	-0.12	.74	-0.09	
South Platte	Colorado	2.84	-0.80	1.09	+0.40	
Arkansas	Colorado	3.02	-0.32	0.74	+0.02	

Accumulated precipitation since October 1, over the watersheds of the Missouri and Arkansas Rivers in Montana, Wyoming and Colorado is below normal. January precipitation also was below normal except over the South Platte and Arkansas drainages in Colorado. The shortage in accumulated precipitation is most pronounced in Montana.

SUMMARY OF FEBRUARY 1 SNOW SURVEYS AND COMPARISON OF DATA

WITH THAT OF PREVIOUS YEARS BY WATERSHEDS

WATERSHEDS	Snow Depth			Water Content			Number courses in average	Snow Density			1945 Water Content in Percent of	
	Ten Year Avg.*	1944	1945	Ten Year Avg.*	1944	1945		Ten Year Avg.*	1944	1945	Ten Year Avg.*	1944
	In.	In.	In.	In.	In.	In.		Percent	Percent	Percent		
MISSOURI RIVER												
Jefferson River	18.7	10.1	16.2	3.8	1.7	2.8	2	20	17	17	74	165
Madison River	41.4	25.6	32.5	10.9	5.6	7.6	6	27	22	23	70	136
Gallatin River	25.8	19.8	18.5	6.0	4.1	3.9	3	23	21	21	65	95
Missouri River**	20.2	10.8	15.3	4.7	2.4	3.2	4	23	22	21	68	133
Marias River	30.8	18.6	24.2	9.0	4.6	6.9	1	29	25	28	77	150
Shoshone River	40.6	27.8	29.1	11.0	5.4	8.2	2	27	19	28	74	152
Bighorn River	29.3	24.6	22.4	7.2	4.8	5.2	9	25	20	23	72	108
Cheyenne	19.3	21.3	17.3	3.4	3.8	3.1	2	18	18	18	91	82
North Platte River	40.2	29.6	34.3	9.7	6.1	8.0	10	24	21	23	82	131
Sweetwater River	30.3	24.9	22.2	6.6	4.6	3.9	2	22	18	18	59	85
Laramie River	25.8	17.3	26.2	6.1	3.4	5.6	8	24	20	21	92	165
South Platte River***	16.9	12.6	13.1	2.8	1.3	1.6	3	17	10	12	57	123
Crow Creek	13.7	11.5	15.1	2.7	1.8	2.7	1	20	16	18	100	150
Boudre River	25.4	14.9	25.0	6.2	3.4	5.5	6	24	23	22	89	162
Big Thompson River.	34.0	21.8	27.5	8.2	4.1	5.4	2	24	19	20	66	131
St. Vrain River	26.5	15.0	25.1	6.0	2.7	5.2	1	23	18	21	87	193
Boulder Creek	20.7	12.2	23.0	5.6	2.3	5.8	2	27	19	25	103	252
Clear Creek	31.2	21.0	27.6	6.9	4.2	5.5	2	22	20	20	80	131
ARKANSAS RIVER	26.5	21.5	23.2	5.6	3.9	4.7	9	21	18	20	84	120

*Some for shorter periods.

**Missouri River, Helena-Great Falls.

***Above Denver, Colo.

MISSOURI AND ARKANSAS RIVER WATERSHEDS
Summary of Federal and State Cooperative Snow Surveys
Issued February 10, 1945, at Fort Collins, Colo.

Main Drainage and Snow Course	Local Drainage	State	Locality	Description	Elev.	National Forest	Feb. 1 Snow Cover Measurements			
							Av. Snow Depth	Av. Water Content	In.	In.
JEFFERSON RIVER	Red Rock Cr.	Idaho	6mi. N. Spencer	21-13N-36E	6800	Targhee	23.8	13.4	22.0	5.1
	Rock Creek	Mont.	13mi. NE. Sula	16-2N-17W	5400	Bitterroot	--	8.0	--	--
	N. Fk. Big Hole	Mont.	Gibbons Pass	4-2S-19W	7100	"	--	26.7	--	--
	Pipestone Cr.	"	Pipestone Pass	11-1N-7W	7200	Deer Lodge	13.6	6.8	10.4	2.6
Average for Drainage							18.7	10.1	16.2	3.8
MADISON RIVER	Firehole R.	Wyo.	Lewis Lake	44-3N-10-6W	7700	Yel. Nat. P.	44.6	28.9	36.0	12.8
	"	"	3mi. S. Lewis L.	44-2N-10-7W	7900	"	82.5	39.6	52.0	19.2
	South Fork	Idaho	Big Springs	34-14N-44E	6500	Targhee	43.6	29.3	30.0	10.7
	South Fork	Mont.	W. Yellowstone	34-13S-5E	6700	Gallatin	29.3	15.3	23.0	6.6
	Greyling Cr.	"	8mi. S. Gallatin	1-11S-5E	7150	Yel. Nat. P.	36.4	23.9	27.3	8.9
	Cabin Creek	"	Hebgen Dam	22-11S-3E	6550	Gallatin	32.0	16.3	26.9	7.2
	Denny Cr.	Idaho	5mi. E. Henry's L.	7-15N-44E	6500	Targhee	--	--	--	--
Average for Drainage							41.4	25.6	32.5	10.9
GALLATIN RIVER	Bozeman Cr.	Mont.	12mi. SE. Bozeman	31-3S-7E	6600	Gallatin	22.0	18.4	16.5	4.9
	"	"	"	31-3S-7E	6600	"	18.9	17.0	11.7	4.2
	Gallatin River	"	8mi. S. Gallatin	1-11S-5E	7150	Yel. Nat. P.	36.4	23.9	27.3	8.9
	Average for Drainage						25.8	19.8	18.5	6.0

*On adjacent drainage

†Readings Jan. 17

‡Average for period of record.

MISSOURI AND ARKANSAS RIVER WATERSHEDS
Summary of Federal and State Cooperative Snow Surveys
Issued February 10, 1945, at Fort Collins, Colo.

Main Drainage and No. Snow Course	Local Drainage	State	Location		Elev.	National Forest	Feb. 1 Snow Cover Measurements					
			Locality	Description			Av. Snow Depth Av. @ 1944 1945	Av. Water Content Av. @ 1944 1945	In.	In.	In.	In.
MISSOURI RIVER**												
6 Chessman Res.	Tennile Cr.	Mont.	11mi. SW Helena	2-3N-5W	6200	Helena	11.0	4.0	7.4	2.5	0.8	1.4
41 Tennile Cr. Lower	Tennile Cr.	"	17mi. SW Helena	13-8N-6W	6250	"	17.8	8.6	13.6	3.9	1.6	2.7
42 Tennile Cr. Middle	"	"	"	13-8N-6W	6300	"	24.2	13.6	19.2	5.6	3.1	3.6
43 Tennile Cr. Upper	"	"	"	19-8N-5W	8000	"	27.9	16.8	21.0	7.0	4.2	5.0
							20.2	10.8	15.3	4.7	2.4	3.2
MARIAS RIVER												
20 Marias Pass.	Two Medicine	"	Summit	48-3N13-4W	5250	Glacier NP	30.8	18.6	24.2	9.0	4.6	6.9
SHOSHONE RIVER												
32 Sylvan Pass	Middle Creek	Wyo.	Sylvan Pass	12-52N-110W	7100	Yel. Nat. P.	37.4	20.7	26.2	10.4	4.4	7.6
50 Brooks Lake #3*	Shoshone R.	Wyo.	Brooks Lake	23-44N-110W	9200	Washakie	43.7	35.0	32.0	11.7	6.3	8.9
							40.6	27.8	29.1	11.0	5.4	8.2
BIGHORN RIVER												
12 Togwotee Pass	Wind River	Wyo.	Togwotee Pass	29-44N-110W	9600	Teton	58.0	53.5	48.0	16.8	13.3	13.4
14 Dome Lake*	Goose Cr.	Wyo.	Dome Lake	11-53N-87W	8300	Bighorn	17.2	22.4	18.7	4.2	6.1	5.0
45 Sawmill Glade	Popo Agie R.	"	13mi. SW Lander	3-31N-101W	8500	Washakie	20.4	24.8	16.3	4.2	3.8	3.2
46 Blue Ridge	"	"	15mi. "	27-31N-101W	9500	"	27.3	28.2	17.6	5.7	4.6	2.6
47 South Pass	"	"	19mi. "	13-30N-101W	9000	"	29.7	23.1	20.8	6.4	3.6	3.5
49 Sheridan Cr. R. S. #2	L. Popo Agie R.	"	16mi. NW Dubois	3-42N-109W	7500	"	21.7	9.9	16.4	4.8	1.6	3.5
50 Brooks Lake #3	Sheridan Cr.	"	Brooks Lake	23-44N-110W	9200	"	43.7	35.0	32.0	11.7	6.3	8.9
51 St. Lawrence R. S.	Wind River	"	27mi. NW Lander	26-1N-4W	9000	Shos. I. R.	---	14.4	---	---	1.8	---
52 Mosquito Park RS	Trout Creek	"	18mi. "	23-28-3W	9500	"	---	24.0	---	---	4.1	---
53 DuNoir	Wind River	"	9mi. NW Dubois	27-42N-108W	8750	Washakie	25.5	12.7	20.9	5.9	2.2	4.1
54 T-Cross Ranch	Horse Creek	"	12mi. N. Dubois	1-43N-107W	8000	"	20.3	11.5	11.5	4.7	2.0	2.2
							29.3	24.6	22.4	7.2	4.8	5.2
							Average for Drainage					

*On adjacent drainage

@Average for period of record

** Between Helena and Great Falls

MISSOURI AND ARKANSAS RIVER WATERSHEDS
Summary of Federal and State Cooperative Snow Surveys
Issued February 10, 1945, at Fort Collins, Colo.

Main Drainage and Snow Course		Local Drainage	State	Location Locality	Description	Elev.	National Forest	Feb. 1 Snow Cover Measurements					
No.	Snow Course							Av. @ 1944	Snow Depth 1944	Av. @ 1945	Water Content 1944	Content 1945	
NO. PLATTE RIVER													
1	Cameron Pass	Michigan Cr.	Colo.	Cameron Pass	2-6N-76W	10300	Roosevelt	In.	In.	In.	In.	In.	
7	Park View	Illinois Cr.	"	7mi. SE. Rand	24-5N-78W	9200	Routt	38.8	30.5	37.5	10.4	8.0	
8	Columbine Lodge	Grizzly Cr.	"	Hot. Ears Pass	21-5N-82W	9300	"	23.5	20.0	22.8	4.5	2.9	
62	Willow Creek P.*	Illinois Cr.	"	Willow Cr. Pass	1-4N-78W	9500	Arapaho	50.6	29.8	46.3	12.5	7.2	
7	Bottle Creek	Encampment Cr.	Wyo.	7mi. SW. Encampment	24-14N-85W	8200	Medicine Bow	29.1	21.8	25.5	6.0	3.1	
8	Webber Spring	"	"	10mi. W.	27-14N-85W	9000	"	28.9	18.2	23.0	6.6	3.6	
9	Old Battle	"	"	12mi. W.	29-14N-85W	9800	"	36.2	27.1	29.7	8.5	6.0	
37	North French Cr.	N. French Cr.	"	Cent/Saratoga	27-16N-80W	10200	"	61.0	57.2	47.9	16.1	13.8	
38	N. Barrett Cr. #2	Barrett Cr.	"	"	30-16N-80W	9400	"	58.3	40.1	51.0	15.1	8.0	
39	Ryan Park #2	"	"	"	34-16N-81W	8400	"	45.6	29.8	36.1	10.7	5.4	
						Average for Drainage	"	30.4	21.0	23.2	6.4	2.6	
						Average for Drainage	"	40.2	29.6	34.3	9.7	6.1	
SWEETWATER RIVER													
29	Granier Meadows	Rock Creek	Wyo.	20mi. SW. Lander	19-30N-100W	9000	Washakie	30.9	26.7	23.6	6.8	5.5	
47	South Pass*	"	"	19mi. "	13-30N-101W	9000	"	29.7	23.1	20.8	6.4	3.6	
						Average for Drainage	"	30.3	24.9	22.2	6.6	4.6	
LARAMIE RIVER													
3	Brooklyn Lake	Nash Fork	Wyo.	7mi. NW. Centennial	11-16N-79W	10200	Medicine Bow	39.8	29.5	39.1	11.4	6.5	
11	Fox Park	Fox Creek	"	Fox Park	21-13N-78W	9200	"	22.1	13.1	23.6	4.9	2.0	
34	Pole Mountain #2*	Soldier Cr.	"	10mi. SE. Laramie	35-15N-72W	8700	"	13.7	11.5	15.1	2.7	1.8	
35	Libby Lodge #2	Libby Creek	"	3mi. NW. Centennial	29-16N-78W	8700	"	20.6	10.2	19.2	4.5	1.8	
36	Hairpin Turn #2	Nash Fork	"	5mi. NW. "	24-16N-79W	9500	"	23.3	12.6	21.4	5.5	2.2	
4	W. Port. G-P. Tunnel	Laramie R.	Colo.	4mi. N. Chambers L.	7-8N-75W	8600	Roosevelt	20.1	11.5	21.9	4.8	2.8	
50	Deadman Hill*	Deadman Cr.	"	10mi. W. R. Feather	26-10N-75W	10200	"	30.2	19.9	33.1	6.7	4.3	
88	Roach	LaGarde Cr.	"	8mi. NW. Glendevy	5-10N-77W	9800	"	36.8	30.0	36.0	8.3	5.4	
						Average for Drainage	"	25.8	17.3	26.2	6.1	3.4	

*On adjacent drainage
@Average for period of record

MISSOURI AND ARKANSAS RIVER WATERSHEDS
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Issued February 10, 1945, at Fort Collins, Colo.

Main Drainage and No. Snow Course		Local Drainage	Location		Elev.	National Forest	Feb. 1 Snow Cover Measurements						
			State	Locality			Descrip- tion	Av. Snow Depth 1944	Av. Water Content 1944	Av. Snow Depth 1945	Av. Water Content 1945		
CHEYENNE RIVER													
1	Upper Spearfish	Spearfish Cr.	S. Dak.	24mi. SW. Spearfish	21-3N-1E	6500	Black Hills	23.6	25.8	21.5	4.5	4.7	4.3
2	Upper Castle	Castle Cr.	"	11mi. NW. Deerfield	24-2N-1E	6300	"	---	---	20.4	---	---	3.1
3	Deerfield	Silver Cr.	"	3mi. NW. Deerfield	23-1N-2E	6010	"	15.0	16.8	13.1	2.4	2.8	1.9
							Average for Drainage	19.3	21.3	17.3	3.4	3.8	3.1
SOUTH PLATTE RIVER													
14	Hoosier Pass	S. Platte R.	Colo.	Hoosier Pass	13-8S-7W	11400	Pike	24.9	16.8	16.4	4.7	2.1	2.4
15	Fairplay	"	"	Fairplay	33-9S-7W	10000	"	4.8	4.2	4.7	0.5	0.2	0.6
83	Jefferson Cr. #2	Jefferson Cr.	"	5mi. NW. Jefferson	14-7S-76W	10100	"	21.1	16.7	18.2	3.2	1.7	1.8
							Average for Drainage	16.9	12.6	13.1	2.8	1.3	1.6
CROW CREEK													
34	Pole Mountain #2	Crow Creek	Wyo.	10mi. SE. Laramie	35-15N-72W	8700	Medicine Bow	13.7	11.5	15.1	2.7	1.8	2.7
POUDRE RIVER													
1	Cameron Pass	Joe Wright Cr.	Colo.	Cameron Pass	2-6N-76W	10300	Roosevelt	38.8	30.5	37.5	10.4	8.0	9.7
2	Chambers Lake	Poudre River	"	Chambers Lake	6-7N-75W	9000	"	14.8	4.5	17.7	3.9	1.5	4.5
3	Big South	"	"	2mi. E. Chambers L	33-8N-75W	8600	"	5.2	0.0	6.9	1.1	0.0	1.8
50	Deadman Hill	N. Poudre R.	"	10mi. W. R. Feather	26-10N-75W	10200	"	30.2	19.9	33.1	6.7	4.3	6.5
65	Lake Irene*	Big S. Poudre	"	1mi. SW. Milner P.	8-5N-75W	10600	Ry. Mtn. N.P.	44.3	27.9	34.3	11.5	5.7	6.7
68	Hour Glass Lake	L. S. Poudre	"	2mi. NW. Pingree P.	18-7N-73W	9500	Roosevelt	19.0	6.8	20.8	3.8	0.7	3.7
							Average for Drainage	25.4	14.9	25.0	6.2	3.4	5.5
BIG THOMPSON													
65	Lake Irene*	Big Thompson R.	Colo.	1 mi. SW. Milner P.	8-5N-75W	10600	Ry. Mtn. N.P.	44.3	27.9	34.3	11.5	5.7	6.7
95	Hidden Valley #2	Hidden Val. Cr.	"	9mi. W. Estes F.	23-5N-74W	9550	"	23.8	15.7	20.7	5.0	2.4	4.1
							Average for Drainage	34.0	21.8	27.5	8.2	4.1	5.4

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No.	Main Drainage and Snow Course	Local Drainage	State	Locality	Description	Elev.	National Forest	Feb. 1 Snow Cover Measurements					
								Av. Snow Depth	Av. Water Content	Av. C. 1944	Av. C. 1945	Av. C. 1944	Av. C. 1945
								In.	In.	In.	In.	In.	In.
41	ST. VRAIN RIVER Wild Basin	M. St. Vrain R.	Colo.	5 mi. W. Allens P	24-3W-74W	10000	Ry. Mtn. N.P.	26.5	15.0	25.1	6.0	2.7	5.2
5	Boulder Creek El Port. Moffat T.	S. Boulder Cr.	Colo.	East Portal	2-2S-74W	9400	Roosevelt	9.4	5.2	13.5	2.2	0.9	3.4
60	University Camp #2	N. Boulder Cr.	"	5 mi. SW. Ward	28-1N-73W	10300	"	32.0	19.3	32.6	8.9	3.7	8.2
					Average for Drainage			20.7	12.2	23.0	5.6	2.3	5.8
61	Loveland Pass #2	Clear Creek	Colo.	10 mi. W. Georgetown	27-4S-76W	10100	Arapaho	27.6	19.4	28.2	5.5	4.0	5.4
97	Grizzly Peak*	"	"	1 mi. W. Loveland P	2-5S-76W	11250	"	34.7	22.5	26.9	8.3	4.5	5.6
					Average for Drainage			31.2	21.0	27.6	6.9	4.2	5.5
ARKANSAS RIVER													
19	Tennessee Pass	Tennessee Cr.	Colo.	Tennessee Pass	21-8S-80W	10200	Cochetopa	23.7	17.1	19.0	4.2	3.0	3.1
21	Twin Lakes Tun.	Lake Creek	"	9 mi. W. Twin Lakes	22-11S-82W	10500	"	25.1	18.2	19.9	5.7	3.6	4.1
42	Marshall Creek*	Poncha Cr.	"	Marshall Pass	24-48N-6E	10800	"	32.3	29.4	32.9	6.9	4.0	7.0
43	Poncha Creek	"	"	"	19-48N-7E	10500	"	25.5	21.2	22.1	6.5	5.0	6.1
72	Whiskey Creek #2	Whiskey Cr.	"	Whiskey Cr. Pass	37-2N10S-2W	10300	Maxwell Cr.	15.7	16.9	15.3	3.6	3.2	3.1
74	LaVeta Pass #2*	Cuchara Cr.	"	LaVeta Pass	22-28S-70W	9300	San Cristobal	22.0	20.9	28.0	4.4	3.7	5.7
78	Four Mile Park #2	Lake Creek	"	3 mi. SW. Twin L.	23-11S-81W	9700	Cochetopa	10.1	6.1	0.0	1.8	1.1	0.0
79	Fremont Pass #2	E. Fork Ark. R.	"	Fremont Pass	2-8S-79W	11400	Arapaho	38.2	25.2	30.8	7.7	4.6	5.2
92	Monarch Pass	S. Fork Ark. R.	"	Monarch Pass	16-49N-6E	10500	Cochetopa	46.2	38.6	40.8	9.4	6.7	8.2
					Average for Drainage			26.5	21.5	23.2	5.6	3.9	4.7

*On adjacent drainage

C Average for period of record

The following organizations cooperate in the snow surveys and irrigation water supply forecasts for the Colorado, Missouri-Arkansas and Rio Grande watersheds by furnishing funds or services.

STATE

Colorado State Engineer
Wyoming State Engineer
Utah State Engineer
New Mexico State Engineer
Montana State Engineer
Nebraska State Engineer
Colorado Experiment Station
Colorado Extension Service
Montana Experiment Station
Utah Experiment Station

FEDERAL

Department of Agriculture
Forest Service
Soil Conservation Service
Department of Interior
Bureau of Reclamation
Indian Service
Geological Survey
National Park Service
Department of Commerce
Weather Bureau
War Department
Army Engineer Corps

PUBLIC UTILITIES

Colorado Public Service Company
Western Colorado Power Company
Denver and Rio Grande Western R.R. Company

MUNICIPALITIES

City of Denver
City of Boulder

WATER USERS ORGANIZATIONS

Poudre Valley Water Users' Association
Arkansas Valley Ditch Association
Colorado River Water Conservation District

IRRIGATION PROJECTS

Farmers Reservoir and Irrigation Company
San Luis Valley Irrigation District
Santa Maria Reservoir Company
Costilla Land Company
Uncompahgre Valley Water Users' Association
Wyoming Development Company
Goshen Irrigation District
Kendrick Project
Pathfinder Irrigation District
Salt River Valley Water Users' Association
San Carlos Irrigation and Drainage District

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